CAI-2004-05

UNITED STATES
DEPARTMENT OF LABOR
MINE SAFETY AND HEALTH ADMINISTRATION

COAL MINE SAFETY AND HEALTH

REPORT OF INVESTIGATION

Underground Coal Mine

Fatal Powered Haulage Accident
February 10, 2004

Cucumber Mine
Raw Coal Mining Company, Inc.
Cucumber, McDowell County, West Virginia
ID No. 46-08580

Accident Investigators

Harold Hayhurst
Coal Mine Safety and Health Inspector/Accident Investigator

William L. Sperry
Coal Mine Safety and Health Inspector (Electrical)

Preston T. White
Mine Safety and Health Specialist (Training)

Originating Office
Mine Safety and Health Administration
District 4
100 Bluestone Road
Mount Hope, West Virginia 25880
Stephen J. Gigliotti, Acting District Manager

TABLE OF CONTENTS

OVERVIEW

At approximately 7:35 a.m. on Tuesday, February 10, 2004, a 25-year old roof bolting machine operator with 7 years of mining experience was fatally injured at Raw Coal Mining Company, Inc.'s Cucumber Mine. The accident occurred while the victim, Gary Shannon Addair, was operating an open-type, battery-powered, track-mounted personnel carrier. The personnel carrier entered the track portal, through an open airlock door, and continued to gain speed as it traveled down an 8 to 21 percent grade on damp to wet rails for approximately 139 feet before striking the closed inby airlock door. Addair received fatal injuries when struck by the inby door. The mantrip then traveled approximately 320 feet before derailing.

The personnel carrier was operated at a speed that was inconsistent with track and equipment conditions, and was not controlled so that it could be stopped before striking the inby, closed, airlock door. An inoperable sanding device likely reduced the braking capacity on the personnel carrier at the time of the accident.

GENERAL INFORMATION

At the time of the accident, the Cucumber Mine was operated by Raw Coal Mining Company, Inc. The mine, located near Cucumber, McDowell County, West Virginia, was accessed by five drift openings into the 40-inch thick Pocahontas No. 3 coal seam and was developed approximately 12,000 feet from the surface using the room and pillar system. Coal was extracted from one mining section, which developed eight entries using two Joy 14-10AA remote-controlled continuous mining machines. Coal was transported from the working faces by four Joy 21SC shuttle cars to a belt conveyor system, which carried coal to the surface. The mine employed 39 persons during two production shifts and one maintenance shift per day, six days per week, producing an average of 650 tons of raw coal per day. True Line, Inc., of Thorpe, West Virginia, an independent contracting company, provided engineering services at the mine.

Section crews entered the mine via battery-powered, rail-mounted, self-propelled personnel carriers manufactured by West Virginia Armature. Three units were utilized for the transportation of persons and supplies. A smaller vehicle was used by examiners. The track system contained moderate to steep grades at several locations, descending from an elevation of 1580 feet at the mine portal to 1210 feet near the working faces.

The principal officers for the mine at the time of the accident were:

Herbert A. Asbury.....President
Randall Campbell..... Superintendent

The Mine Safety and Health Administration (MSHA) completed its last regular safety and health inspection on December 12, 2003. Another inspection was started prior to the accident. The Non-Fatal Days Lost (NFDL) injury incidence rate for the mine in 2003 was 0.00, compared to a national NFDL rate of 4.49 for underground mines.

DESCRIPTION OF ACCIDENT

During the midnight maintenance shift on Tuesday, February 10, 2004, several mine employees conducted work in preparation for coal production during the oncoming day shift. On the surface, Brian Hagy, surface man, performed routine maintenance work on the open-type, battery-powered, rail-mounted personnel carriers that were scheduled for use by the oncoming day shift production crew. He used a compressed air hose to blow out the sand pots in order to remove any wet sand in the pots and discharge hoses. Roger Peake, day shift belt examiner, proceeded underground at approximately 6:40 a.m., manually sanding the rails on his way into the mine in advance of the production crews. A preshift examination of the working section was also conducted, after which no hazardous conditions were reported.

John R. Dillon, day shift production crew foreman, countersigned the record of preshift examination for the working section prior to entering the mine. Gary Shannon Addair, shuttle car operator, (victim) filled the two sanders on the inby end of the personnel

carrier involved in the accident immediately prior to the crew loading. James Rambo and Ernest Murray, the mine engineering spad crew, arrived at the mine at or near the scheduled shift starting time of 7:30 a.m. The section crew boarded the two personnel carriers, but delayed their departure to allow the engineers to get their equipment and travel underground with them. Rambo and Murray soon joined Scottie Stinson, roof bolter operator, in the front (inby) passenger compartment of the lead personnel carrier, operated by Addair who was seated in the center of the machine. Howard Mitchell, shuttle car operator; Pete Day, continuous miner operator; and Roger Fowler, shuttle car operator were located in the rear (outby) passenger compartment.

Hagy opened the first airlock door at the portal, which allowed the crews to enter the mine without stopping to operate the electric door hoist. Addair placed the lead personnel carrier in tram mode as he drove down the slight grade to the portal, entering the mine at a faster than normal speed., The track dip increased immediately inby the door on grades of 8% to 21%, which normally required immediate utilization of the dynamic braking system, even when entering the mine slowly after stopping at the door. The second mantrip waited at the portal for the lead mantrip to clear the airlock before entering the mine. The lead mantrip continued to gain speed as it approached the closed inby door. Addair shouted a warning to the other crew members as they approached the closed, inby, airlock door. The mantrip struck the door then traveled approximately 320 feet before derailing.

Crew members realized that Addair was seriously injured. Stinson went to the surface and informed persons on the second mantrip of the accident, who then assisted Stinson in removing the damaged, still partially hung, door to clear the track. Dillon proceeded to the derailed mantrip to render assistance. Dillon assessed Addair's condition, briefly detecting breathing and a pulse. During the assessment Addair stopped breathing and Dillon began CPR. Hagy and James Brewster, day shift outside man and EMT, arrived with the first aid supplies. Brewster utilized arrhythmic electrical defibrillation, administered shock, and continued CPR. David Baker, supply man, called 911.at 7:39 a.m. After the damaged door was removed from the track, the second mantrip was moved to the accident site and used to transport Addair to the surface. CPR was continued until Addair was placed in the EMS unit and transported to the Welch Community Hospital in Welch, West Virginia, where he was pronounced dead at 8:37 a.m.

INVESTIGATION OF THE ACCIDENT

On Tuesday February 10, 2004 at 8:30 a.m., Clyde D. Ratcliff, Supervisory Mine Safety and Health Inspector at the Princeton Field Office, received a call from Eddie Asbury, owner, informing him that a serious accident had occurred at the Cucumber Mine. Harold Hayhurst, Coal Mine Inspector, was assigned to investigate and he immediately proceeded to the mine. William L. Sperry, Coal Mine Inspector (Electrical) and Preston T. White, Mine Safety and Health Specialist (Training), traveled to the mine to assist in the accident investigation and obtain additional information related to the accident. Upon

arriving at the mine, a 103(k) Order was issued to assure the safety of persons during the investigation.

The investigation was conducted in cooperation with the West Virginia Office of Miners' Health, Safety, and Training (WVOMHST) with the assistance of the operator and their employees (refer to Appendix A for a list of persons who participated in the investigation). Representatives of MSHA, the WVOMHST, and company officials traveled underground to the accident site. Photographs, sketches, and relevant measurement were taken at the accident site. Formal interviews with persons who had knowledge of the accident (refer to Appendix B) were conducted on February 11 and February 13, 2004 at the office of WVOMHST in Welch, West Virginia.

DISCUSSION

PERSONNEL CARRIER: The vehicle involved in the accident was an open-type, battery-powered, track-mounted, self-propelled personnel carrier, model HD, serial number 200-1451, originally manufactured by West Virginia Armature and rebuilt by Mankin Equipment, Inc. The vehicle was also used to transport supplies, often pushing a flat car, twice daily, five or six days per week. This was the preferred vehicle at the mine for such duties.

The operator's compartment was located in the center of the machine. The vehicle was a low profile machine, which the driver operated while laying on his back perpendicular to the direction of travel. Passenger compartments were located at both ends of the machine and open on both sides with safety chains at entrances.

The personnel carrier had a nominal weight of 16,000 pounds. The frame was 22 feet long and 7 feet wide, with a height of 28 inches over the rail. It was equipped with 16-inch diameter wheels and operated on 42-inch gauge track.

The personnel carrier received electric power from two, 520 Amp-Hour batteries that weighed approximately 2,350 pounds each. The vehicle was provided with two West Virginia Armature 20 horsepower, 120 volt DC traction motors and a Precision Electric, Inc. ACTRAC Model 30 control unit. The personnel carrier was equipped with a dynamic brake, a service brake and a parking brake. A pull test was performed three times on both the service and the park brake system using the Tension link, model STL-13.5 and Portable Load Indicator. A rubber tired front end loader was used to pull the vehicle. A fully loaded vehicle was simulated using bags of rock dust. With either the service brake or park brake applied, all four wheels skidded on the track indicating adequate braking.

The control unit was located to the right and within easy reach of the vehicle operator. This unit contained the direction selector switch (forward-neutral-reverse) and the speed-brake control switch. Rotation of the handle clockwise from the off position caused speed to increase. The speed-brake switch spring returned to the off position when it was released. Rotation of the handle counterclockwise from the off position resulted in

dynamic braking. The end of the tram control lever was broken off and was found near the inby airlock door. Operation of the tram controls were evaluated and performed in accordance with the Precision Electric Inc. ACTRAC instruction manual.

A man-in-position (foot switch) was installed approximately a month prior to the accident and was located next to the service brake pedal. This switch was operated by the operators left foot. The operator must depress the foot switch to enable the speed-brake control switch and enable the hand pump to release the spring applied park brake. Release of the foot switch disables the speed brake control switch which removes tramming power and dynamic braking. Release of the foot switch also should have automatically applied the parking brake, but that portion of the foot switch had been disconnected and a manually operated dump valve was reinstalled. This prevented the parking brake from automatically setting when the foot switch was released. This dump valve was the same type used prior to installing the foot switch. The design release pressure for the parking brake was 700 psi. The brake system pressure gage measured 570 psi. This significant amount of remaining system pressure indicated that the dump valve was not actuated to apply the park brake during the accident. Any slide would have been due to aggressive use of the dynamic brake or use of the foot service brake.

The lights in both directions of travel were inoperable due to damage to the electrical wires and connections to the halogen lights. The damage to the lighting system appeared to have occurred prior to the accident.

SANDING DEVICES: The inby sanders were purportedly cleaned and filled prior to entering the mine. These would have been the only sanders used when traveling in the inby direction. After the accident, the left inby sander box was completely empty. The right inby sander box still contained sand. After the vehicle was brought to the surface, both inby sander boxes were filled to determine if they functioned properly. They did not. Due to deterioration (slack) in the metal linkage, the plunger did not adequately plug the opening in the bottom of the left inby sander box. All of the sand emptied in 1 minute and 53 seconds. After the sander boxes were filled on the day of the accident, the mantrip was delayed to allow the engineers to travel into the mine on the vehicle. This delay was likely sufficient for the left inby sander box to completely drain before entering the mine, reducing the braking capacity of the personnel carrier. The problem had not been recognized or reported to mine management so that repairs could be made. An adequate preoperational inspection of the sanding devices, including direct observation of the sand discharge, would have likely identified this condition. However, such inspection of underground mobile equipment was not required by mine management and was not performed on the personnel carrier on the day of the accident.

AIRLOCK DOORS: The airlock doors were used to control ventilation. The doors were constructed of 3/16-inch sheet metal with conveyor belt for sealing, hinged along a metal frame attached to the mine roof. The doors swung inby and upward, using an electric chain hoist and pulley arrangement. When the personnel carrier struck the door, the door swung up, hit the roof, bounced back and struck the victim.

The chain hoist was actuated to open and close the door with switches that were hung between the track and the rib on the operator's side of the track. Operators of personnel carriers, entering and exiting the mine, were required to stop and depress the switches until the chain hoist opened the door. The practice of stopping to open the outby door helped ensure that vehicles entered the mine slowly. Since the outby door was opened prior to the personnel carrier arriving at the portal, the vehicle was able to pass through the door at a higher than normal speed. The track grade at the inby door was 10.8 percent.

TRACK CONDITIONS: The grade from the surface to the accident site averaged 8.93 percent over a distance of approximately 170 feet. A maximum grade of 21.2 percent existed for a short distance in this area. The rails, mine roof, and ribs were damp to wet. The entry height averaged 110 inches near the surface and abruptly dropped to a height of approximately 47 inches outby the airlock door involved in the accident. The clearance above the rail to the edge of the airlock door in the open position was approximately 44 to 47 inches. The top of the personnel carrier was 28 inches above the rail. Clearance between the top of the vehicle and the mine roof in other areas of the mine is often less then 6 inches.

OPERATION OF THE PERSONNEL CARRIER: Eyewitnesses indicated the mantrip was on point (in tram mode) from the track switch to the portal. The track immediately inby the door is on grades, from 8% to 21%, and normally requires use of the dynamic braking system. Interview statements varied as to efforts by Addair to slow the mantrip; however, the testimony was consistent in that the mantrip appeared to enter the mine faster than normal. The second mantrip waited at the portal for the lead mantrip to clear the airlock before entering the mine. The lead mantrip continued to gain speed as it approached the closed inby door. John Campbell, a passenger on the second mantrip, observed Addair sitting upright in the operator's compartment as the mantrip descended the grade. Gary Addair shouted a warning to the other crew members as the mantrip approached the closed, inby, airlock door. The mantrip struck the door then traveled approximately 320 feet before derailing.

ROOT CAUSE ANALYSIS

An analysis was conducted to identify the most basic causes of the accident that were correctable through reasonable management controls. During the analysis, causal factors were identified that, if eliminated, would have either prevented the accident or mitigated its consequences.

Listed below are causal factors identified during the analysis and their corresponding corrective actions implemented to prevent a recurrence of the accident:

1. *Causal Factor:* The track was installed on steep grades, ranging from 8.9 percent to 21.2 percent, beginning at the track portal and extending for a distance of approximately 170 feet inside the mine.

Corrective Action: The track was removed in this area and a continuous mining machine was used to reduce the grade from the portal to the inby airlock door location.

2. *Causal Factor:* The airlock doors and door switches were installed on the grade which required track equipment, entering and exiting the mine, to stop on or near steep grades to open and close the doors.

   Corrective Action: The track portal canopy was extended 50 feet and both airlock doors were installed on the surface.

3. *Causal Factor* The sanding devices provided for the personnel carrier were not maintained in proper operating condition. When tested, the sander on the inby operator's side of the vehicle would remain open and continue to apply sand until the sander was empty. Management did not require pre-operational examinations to detect such equipment malfunctions or failures.

   Corrective Action: New stainless steel sanding devices were installed on the personnel carrier. Management has implemented a program to conduct effective pre operational checks of equipment.

4. *Causal Factor:* The personnel carrier entered the mine portal at a rate of speed that did not allow the vehicle to be stopped before contacting the closed airlock door.

   Corrective Action: A Safeguard was issued that required mine management to ensure all self propelled personnel carriers are operated at speeds consistent with conditions and equipment being used. Management has designated specific operators for the track equipment and implemented a program requiring all employees to receive task training every three months. A policy was also established allowing only those persons actually traveling through doors to open and close them.

5. *Causal Factor:* An adequate pre-operational examination was not conducted on the personnel carrier prior to it being put into service.

   Corrective Action: A safeguard requiring pre-operational examinations of mobile track equipment, including the sanders and braking systems, is to be performed and documented before the equipment is operated.

CONCLUSION

The personnel carrier was operated at a speed that was inconsistent with track and equipment conditions, and was not controlled so that it could be stopped before striking the inby, closed, airlock door. Track conditions affecting stopping distances at the approach to the airlock doors included damp to wet rails installed on steep grades. The outby airlock door was opened by someone other than the equipment operator or a passenger, allowing the personnel carrier to approach the door at a speed that was faster than normal. An equipment defect, the inoperable sanding device, likely reduced the braking capacity on the personnel carrier at the time of the accident. This defect was not identified and corrected before the personnel carrier was placed in operation because an adequate pre-operational inspection was not conducted. Mine management did not require such inspections or other equivalent means to ensure that sanding devices were well-maintained prior to using personnel carriers.

Approved By:

ORIGINAL SIGNED BY **July 9, 2004**
Stephen J. Gigliotti Date
Acting District Manager

ENFORCEMENT ACTIONS

1. A 103(k) Order was issued to Raw Coal Mining Company on February 10, 2004, to ensure the safety of persons at the mine until an investigation of the accident could be completed.

2. A 104(a) Citation was issued to Raw Coal Mining Company for a violation of 30 CFR 75.1403, pursuant to Safeguard No. 7201460 issued on March 20, 2001. The operator failed to properly maintain the sanding devices, provided for the No. 2 personnel carrier, serial number 200-1451, manufactured by West Virginia Armature. During an accident investigation, it was determined that the sander on the inby end, operators side, would not hold sand. When sand was added to the sand box, the sand immediately and continuously flowed from the sand box until the box was empty.

3. A 314(b) Safeguard was issued to Raw Coal Mining Company. According to testimony obtained in a fatal powered haulage accident that occurred on February 10, 2004, the No. 2 personnel carrier was not being operated at speeds consistent with conditions and equipment being used. The mantrip entered the mine portal at a speed that did not allow the mantrip to be stopped before contacting the closed inby airlock door. This is a notice to provide safeguards requiring that all self propelled personnel carriers be operated at speeds consistent with conditions and equipment being used and should be so controlled that they can be stopped within the limits of visibility.

4. A 314 (b) Safeguard was issued to Raw Coal Mining Company to require pre-operational examinations of all mobile track equipment, including the sanders and braking systems to be performed and documented before the equipment is operated.

Appendix A
Persons Participating in the Investigation

Raw Coal Mining Company, Inc.

Name	Title
Eddie Asbury	Owner
Donnie Coleman	Safety Consultant
Randy Campbell	Superintendent
John Dillon	Section Foreman
John R. Campbell	Electrician

True Line, Inc.

Name	Title
James Rambo	Engineer
Ernest Murray	Engineer

West Virginia Office of Miners Health, Safety and Training

Name	Title
C.A. Phillips	Deputy Director
Fred Stinson	Inspector at Large
Terry L. Farley	Health and Safety Administrator
Bobby Thornsbury	Electrical Inspector
Janice Molineaux	District Inspector
Dwight McClure	District Inspector (Roof Control)

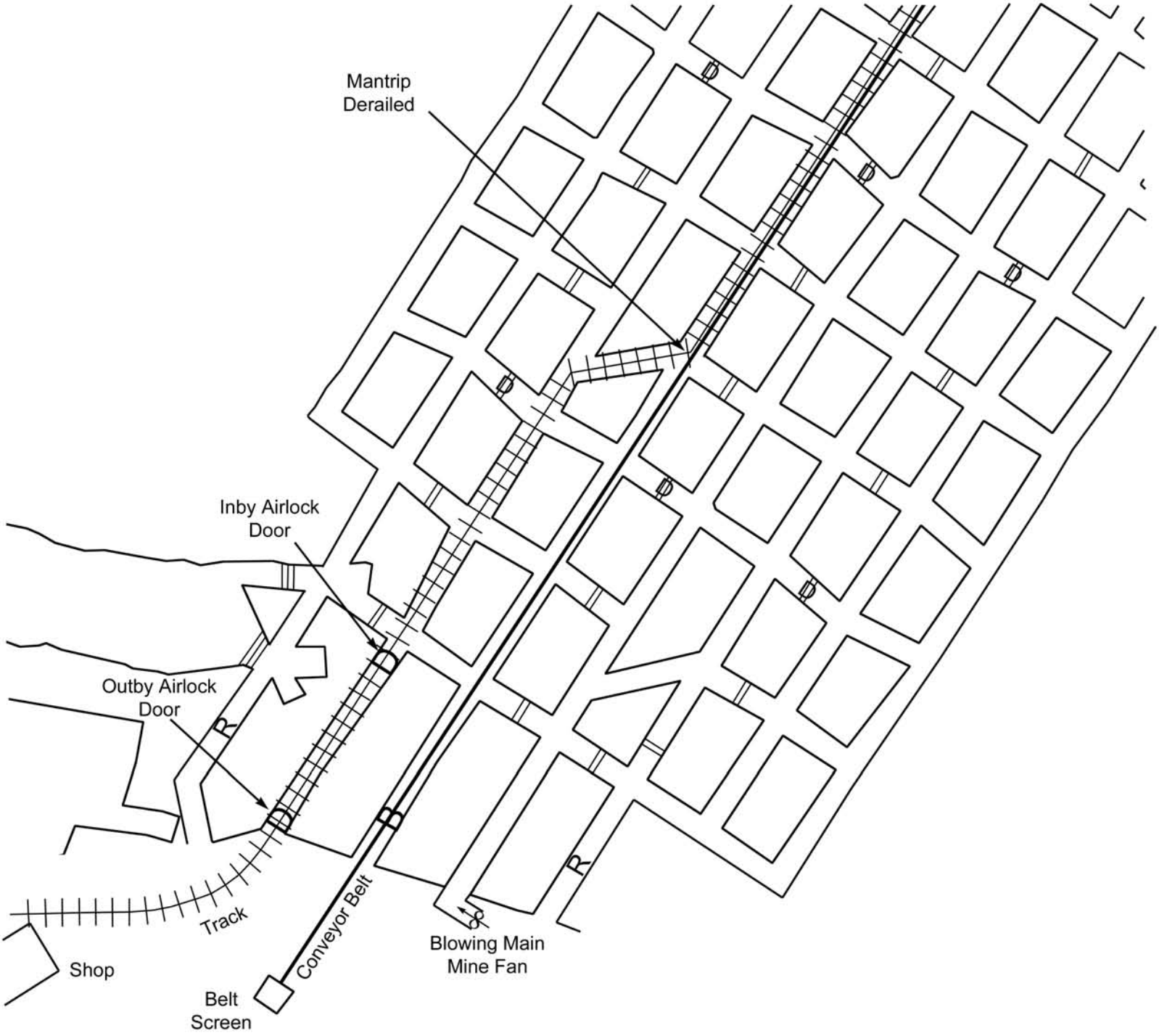
Mine Safety and Health Administration

Name	Title
Harold Hayhurst	Coal Mine Safety and Health Inspector/Accident Investigator
William L. Sperry	Coal Mine Safety and Health Inspector (Electrical)
Preston T. White	Mine Safety and Health Specialist (Training)
Jim Beha	Accident Investigation Coordinator
Gary Clark	Mechanical Engineer, Approval and Certification Center

Appendix B

List of Persons Interviewed

Name	Title
Sherman Conley	Roof Bolter Operator-Raw Coal Mining
John Dillon	Section Foreman-Raw Coal Mining
Marty Daughtery	Continuous Miner Operator-Raw Coal Mining
Steven Stinson	Belt Man-Raw Coal Mining
Tracy Carter	Shuttle Car Operator-Raw Coal Mining
Pete Day	Continuous Miner Operator-Raw Coal Mining
Roger Fowler	Shuttle Car Operator-Raw Coal Mining
Howard Mitchell	Shuttle Car Operator-Raw Coal Mining
Roger Peake	Belt Man/Examiner-Raw Coal Mining
Scottie Stinson	Roof Bolter Operator-Raw Coal Mining
David Baker	Supply Man-Raw Coal Mining
John Campbell	Electrician-Raw Coal Mining
James Brewster	Surface Man-Raw Coal Mining
William Hagy	Surface Man-Raw Coal Mining
James Rambo	Engineer-True Line, Inc.
Ernest Murray	Engineer-True Line, Inc.



DRAWING NOT TO SCALE

Appendix C
Map of Accident Site